CLAIMSWhat is claimed is:

1. A rod-type solid-state laser system in which, by means of a relay lens and a coupling lens, a laser beam emitted from a symmetric stable optical resonator consisting of a rod-type solid-state laser medium, a partially reflecting mirror, and a totally reflecting mirror is made to enter an optical fiber, wherein a first reference plane is set at an arbitrary position between the endface, of the rod-type solid-state laser medium arranged close to the partially reflecting mirror, that opposes the partially reflecting mirror and the middle point of the rod-type solid-state laser medium, a second reference plane is set at a position that is optically symmetric with the first reference plane, with respect to the partially reflecting mirror, the relay lens is arranged at a position at which the relay lens transfers the first reference plane onto a first image plane and transfers the second reference plane onto the coupling lens, and the coupling lens is arranged at a position at which the coupling lens transfers the first image plane onto the endface of the optical fiber.

2. The rod-type solid-state laser system according to claim 1, wherein a thin-wall lens is assumed that is optically equivalent to a thermal lens formed at a position between the endface, of the rod-type solid-state laser medium arranged close to the partially reflecting mirror, that opposes the partially reflecting mirror and the middle point of the rod-type solid-state laser medium, and the first reference plane is set at the position of the main plane of the assumed thin-wall lens.

3. The rod-type solid-state laser system according to claim 1, wherein the first reference plane is set on the endface, of the rod-type solid-state laser medium arranged close to the partially reflecting mirror, that opposes the partially reflecting mirror.

4. The rod-type solid-state laser system according to any one of claims 1 to 3, wherein an aperture is arranged at the position of the second reference plane.

5. The rod-type solid-state laser system according to claim 4, wherein the opening diameter of the aperture is approximately the same as the diameter of the rod-type solid-state laser medium.

6. The rod-type solid-state laser system according to claim 1, wherein the rod-type solid-state laser medium is singular.

7. The rod-type solid-state laser system according to claim 1, comprising at least one more rod-type solid-state laser media.

8. A rod-type solid-state laser system in which, by means of a relay lens and a coupling lens, a laser beam emitted from a symmetric stable optical resonator consisting of a rod-type solid-state laser medium, a totally reflecting mirror, a partially reflecting mirror formed of a plane mirror, and a is made to enter an optical fiber, wherein a first reference plane is set at a position, between the partially reflecting mirror and the middle point of the

rod-type solid-state laser medium arranged close to the partially reflecting mirror, at which the diameter of a laser beam is constant, regardless of the condition of the thermal lens of the rod-type solid-state laser medium, a second reference plane is set at a position that is optically symmetric with the first reference plane, with respect to the partially reflecting mirror, the relay lens is arranged at a position at which the relay lens transfers the first reference plane onto a first image plane and transfers the second reference plane onto the coupling lens, and the coupling lens is arranged at a position at which the coupling lens transfers the first image plane onto the endface of the optical fiber.

9. The rod-type solid-state laser system according to claim 8, wherein an internal aperture for limiting the diameter of a laser beam is provided at a position between the rod-type solid-state laser medium and the partially reflecting mirror, and the first reference plane is set at the position of the internal aperture.

10. The rod-type solid-state laser system according to claim 8, wherein an internal aperture for limiting the diameter of a laser beam is provided at a position between the rod-type solid-state laser medium and the totally reflecting mirror, and the first reference plane is set at a position that, toward the rod-type solid-state laser medium, is apart from the partially reflecting mirror by the same distance as that between the internal aperture and the totally reflecting mirror.

11. The rod-type solid-state laser system according to any one of claims 8 to 10, wherein an aperture is arranged at the position of the second reference plane.

12. The rod-type solid-state laser system according to claim 11, wherein the opening diameter of the aperture is approximately the same as the opening diameter of the internal aperture.

13. The rod-type solid-state laser system according to any one of claims 8 to 10, wherein the rod-type solid-state laser medium is singular.

14. The rod-type solid-state laser system according to any one of claims 8 to 10, comprising at least one more rod-type solid-state laser media.

15. A rod-type solid-state laser system in which rod-type solid-state laser media are provided each spaced evenly apart from one another, a totally reflecting mirror formed of a plane mirror is arranged at a position that is apart from the outer endface of the rod-type solid-state laser medium arranged at an endmost position, by approximately half the distance by which the rod-type solid-state laser media are each spaced apart from one another, a partially reflecting mirror formed of a plane mirror is arranged at the approximately middle position between two arbitrary neighboring ones of the rod-type solid-state laser media, thereby configuring an optical resonator that defined by the totally reflecting mirror and the partially reflecting mirror, a laser beam emitted from the optical resonator is

amplified by the rod-type solid-state laser media, utilized as amplifiers, other than the rod-type solid-state laser medium utilized for the optical resonator, and by means of a relay lens and a coupling lens, the laser beam is made to enter an optical fiber, wherein a virtual partially reflecting mirror is assumed at a position that is apart from the emitting-side endface of the rod-type solid-state laser medium situated at the laser-beam emitting end, by approximately half the distance by which the rod-type solid-state laser media are each spaced apart from one another, a first reference plane is set at an arbitrary position between the endface, of the rod-type solid-state laser medium arranged close to the virtual partially reflecting mirror, that opposes the virtual partially reflecting mirror and the middle point of said rod-type solid-state laser medium, a second reference plane is set at a position that is optically symmetric with the first reference plane, with respect to the virtual partially reflecting mirror, the relay lens is arranged at a position at which the relay lens transfers the first reference plane onto a first image plane and transfers the second reference plane onto the coupling lens, and the coupling lens is arranged at a position at which the coupling lens transfers the first image plane onto the endface of the optical fiber.

16. The rod-type solid-state laser system according to claim 15, wherein a thin-wall lens is assumed that is optically equivalent to a thermal lens formed at a position between the endface, of the rod-type solid-state laser medium arranged close to the virtual partially reflecting mirror, that opposes the virtual partially reflecting mirror and the middle point of said

rod-type solid-state laser medium, and the first reference plane is set at the position of the main plane of the assumed thin-wall lens.

17. The rod-type solid-state laser system according to claim 15, wherein the first reference plane is set on the endface, of the rod-type solid-state laser medium arranged close to the virtual partially reflecting mirror, that opposes the virtual partially reflecting mirror.

18. The rod-type solid-state laser system according to any one of claims 15 to 17, wherein an aperture is arranged at the position of the second reference plane.

19. The rod-type solid-state laser system according to claim 18, wherein the opening diameter of the aperture is approximately the same as the diameter of the rod-type solid-state laser medium.

20. A rod-type solid-state laser system in which rod-type solid-state laser media are provided each spaced evenly apart from one another, a totally reflecting mirror formed of a plane mirror is arranged at a position that is apart from the outer endface of the rod-type solid-state laser medium arranged at an endmost position, by approximately half the distance by which the rod-type solid-state laser media are each spaced apart from one another, a partially reflecting mirror formed of a plane mirror is arranged at the approximately middle position between two arbitrary neighboring ones of the rod-type solid-state laser media, thereby configuring an optical

resonator that defined by the totally reflecting mirror and the partially reflecting mirror, and a laser beam emitted from the optical resonator is amplified by the rod-type solid-state laser media, utilized as amplifiers, other than the rod-type solid-state laser medium utilized for the optical resonator, and by means of a relay lens and a coupling lens, the laser beam is made to enter an optical fiber, wherein a virtual partially reflecting mirror is assumed at a position that is apart from the emitting-side endface of the rod-type solid-state laser medium situated at the laser-beam emitting end, by approximately half the distance by which the rod-type solid-state laser media are each spaced apart from one another, a first reference plane is set at a position, between the virtual partially reflecting mirror and the middle point of the rod-type solid-state laser medium arranged close to the virtual partially reflecting mirror, at which the diameter of a laser beam is constant, regardless of the condition of the thermal lens of the rod-type solid-state laser medium, a second reference plane is set at a position that is optically symmetric with the first reference plane, with respect to the virtual partially reflecting mirror, the relay lens is arranged at a position at which the relay lens transfers the first reference plane onto a first image plane and transfers the second reference plane onto the coupling lens, and the coupling lens is arranged at a position at which the coupling lens transfers the first image plane onto the endface of the optical fiber.

21. The rod-type solid-state laser system according to claim 20, wherein an internal aperture for limiting the diameter of a laser beam is provided at a position between the rod-type solid-state laser medium, in the optical

resonator, arranged close to the partially reflecting mirror and the partially reflecting mirror, and the first reference plane is set at a position that, toward the rod-type solid-state laser medium, is apart from the virtual partially reflecting mirror by the same distance as that between the internal aperture and the partially reflecting mirror.

22. The rod-type solid-state laser system according to claim 20, wherein an internal aperture for limiting the diameter of a laser beam is provided at a position between the rod-type solid-state laser medium, in the optical resonator, arranged close to the totally reflecting mirror and the totally reflecting mirror, and the first reference plane is set at a position that, toward the rod-type solid-state laser medium, is apart from the virtual partially reflecting mirror by the same distance as that between the internal aperture and the totally reflecting mirror.

23. The rod-type solid-state laser system according to any one of claims 20 to 22, wherein an aperture is arranged at the position of the second reference plane.

24. The rod-type solid-state laser system according to claim 23, wherein the opening diameter of the aperture is approximately the same as the opening diameter of the internal aperture.